

IPUOCRs Evaluated by Normandeau Associates



Image by Al Larson

- **Fishing**
- **Hydroelectric facilities**
- **Recreational boating**
- **Riparian and wetland resources**
- **Water pollution abatement**
- **Water quality standards**
- **Water supply**

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Al Larson

- **Recreational boating**
- **Fishing**
- **Water Supply**

Mark Hutchins

- **Hydroelectric facilities**
- **Water pollution abatement**
- **Water quality standards**

Lee Carbonneau

- **Natural communities and RTE species**

Recreational Boating



Image by Don Kretchmer

- IPUOCR is kayaking and canoeing.
- Flow dependent at average to high flows.
- Not navigable at low flow.
- Evaluated qualitatively by field survey October 2005.

Recreational Boating



Image by Don Kretchmer

- Boating season: spring snowmelt and other major runoff events.
- Greenville section (Reaches 1-2) most popular to run.
- 700 cfs (4.1 cfsm, Merrimack gage) minimum flow for running.

Recreational Boating PISF

- Use is flow dependent and greatest use in Reaches 1 and 2.
- Lowest flow for recreational boating 150 cfs (4 cfs/m, normalized), which is the proposed Protected Instream Flow (PISF).

| PISFs for selected IPUOCRs | | | | | | | |
|----------------------------|---|----------|--|------------------|---|---|---|
| IPUOCR | Reach | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Recreation | 150 cfs; 4.0 cfs | | Use is not dependent on Souhegan River flow. | | | | |
| Fishing | Use is dependent on Souhegan River flow only to the extent that it protects the fishery resource. Fish and aquatic habitat apply. | | | | | | |
| Hydropower | ~20 cfs; ~0.7 cfs | No users | ~42.2 cfs; ~0.44 cfs | No users | | | |
| Pollution Abatement | 2.4 cfs; <0.1 cfs | | | 9.4 cfs; <0.1cfs | | | |
| Water Supply | Use is not dependent on Souhegan River flow | | | | | | |

Fishing



Image by Al Larson

- Souhegan River managed for coldwater fishery.
- Multiple access points along river, with fishing instream (wading) and from shore.
- Special Rules in effect for upper Souhegan River: 300 ft. upstream of green bridge on Old Wilton Road in Greenville to 300 ft downstream of Route 31 bridge in Wilton.

Fishing



Image by Tom Ballestero

- No closed season for all species except salmon and smelt. From Oct. 16 through June 15 all fish must be released single hook lure and flies (barbless).
- From June 16 to Oct 15 fish can be taken by all legal methods, limit for brook trout 5 fish or 5 pounds.

Fishing

| Total Fish Stocked in the Souhegan River - 2004 | | | | |
|---|---------|-------------|----------------|-------------|
| Town | Species | Age of Fish | Number of Fish | lbs of fish |
| AMHERST | BT | 1+YR | 700 | 350 |
| AMHERST | EBT | 1+YR | 650 | 305 |
| AMHERST | RT | 1+YR | 780 | 780 |
| GREENVILLE | EBT | 1+YR | 600 | 313 |
| GREENVILLE | RT | 1+YR | 450 | 450 |
| MERRIMACK | BT | 1+YR | 800 | 400 |
| MERRIMACK | RT | 1+YR | 200 | 200 |
| MILFORD | BT | 1+YR | 1,350 | 585 |
| MILFORD | EBT | 1+YR | 820 | 425 |
| MILFORD | RT | 1+YR | 1,125 | 1125 |
| NEW IPSWICH | EBT | 1+YR | 600 | 300 |
| NEW IPSWICH | RT | 1+YR | 750 | 750 |
| WILTON | BT | 1+YR | 1,350 | 585 |
| WILTON | EBT | 1+YR | 1,030 | 508 |
| WILTON | RT | 1+YR | 975 | 975 |

BT – Brown Trout EBT – Eastern Brook Trout
RT – Rainbow Trout

- Coldwater fishery actively managed by NH Fish and Game with stocking of trout in several sections of the river.
- Multiple warm water species also present for recreational fishing:

sunfish
perch
bass
bluegill

Fishing

- Coldwater fishery actively managed by NH Fish and Flow dependent resource, proposed PISFs discussed later in this presentation.

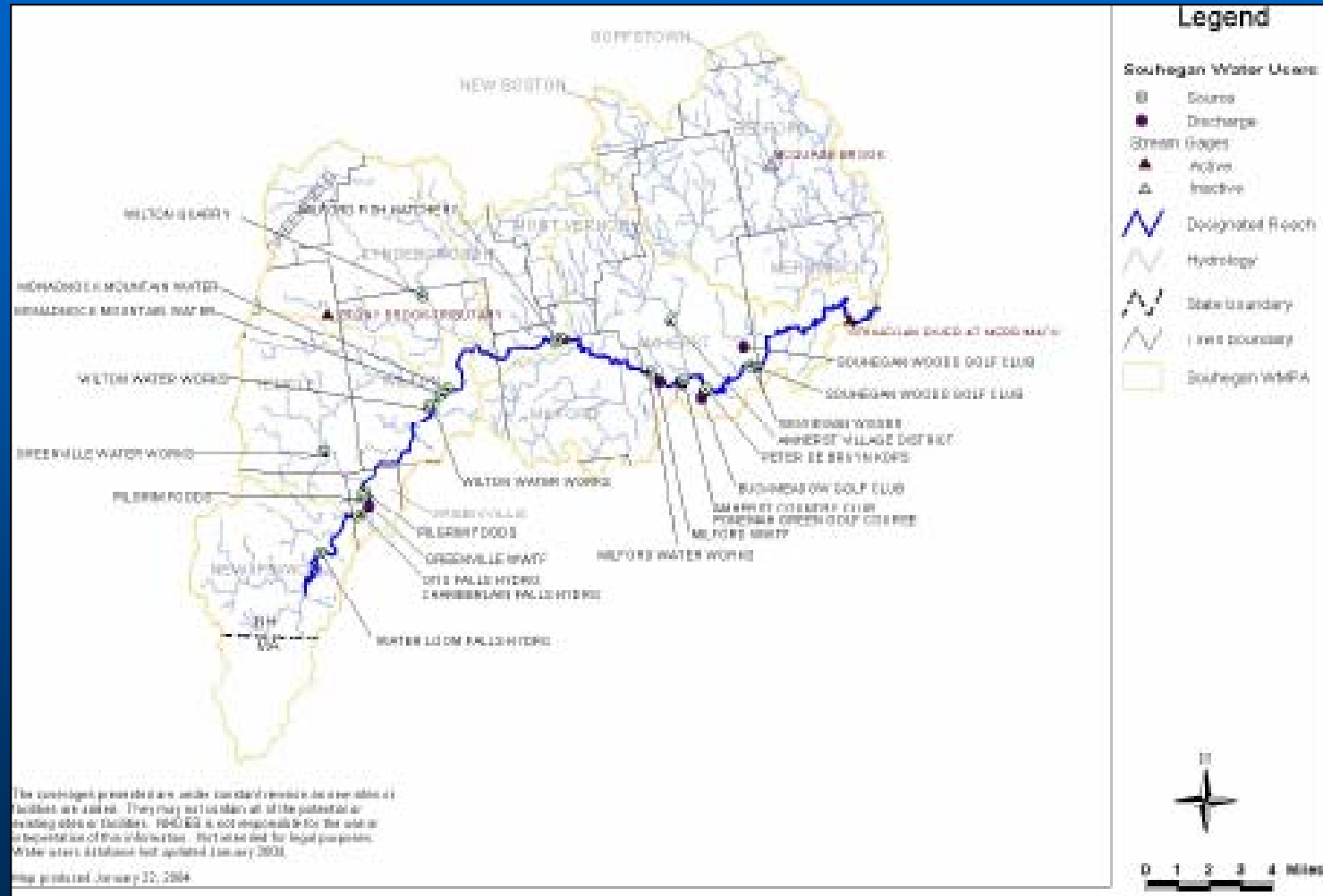
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| Water Supply | Use is not dependent on Souhegan River flow | | | | | | |

Public Water Supply

Per Env-Ws 302.2 a Public Water Supply or System is defined as:

- a system for the provision to the public of piped water for human consumption,
- has at least 15 service connections or,
- regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Public Water Supply



Public Water Supply

Surface Water Supply Source

- Greenville Water Works

Ground Water Supply Source

- Wilton Water Works
- Milford Water Works
- Pennichuck Water Works

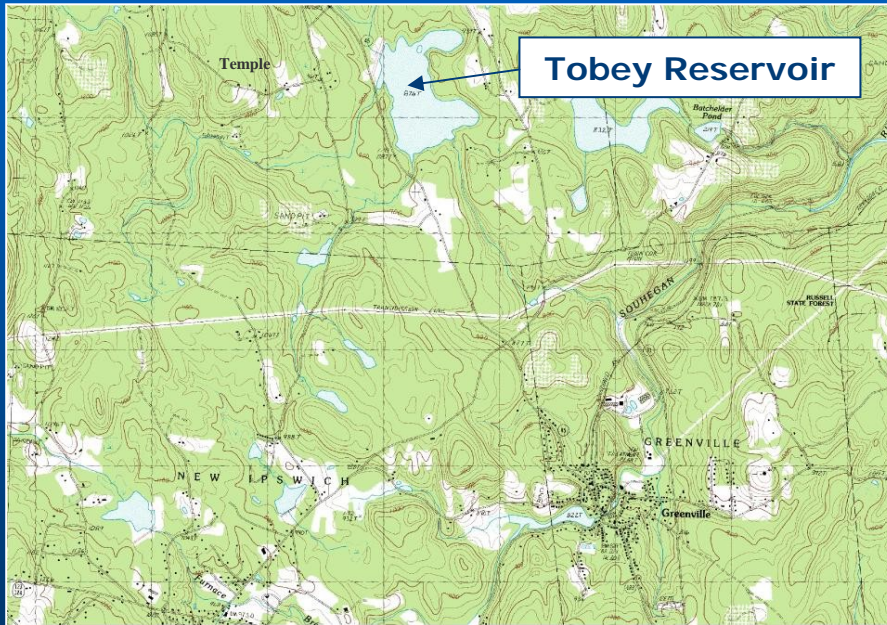
Badger Hill – Milford

Souhegan Woods – Amherst

Amherst Village District - Amherst

Public Water Supply

Greenville Water Works



Source USGS

- Tobey Reservoir.
- Impounds Gambol Brook and unnamed tributary.
- No direct diversion from Souhegan River.
- Monthly water use ranges from 0.20 cfs to 0.25 cfs, mean = 0.23 cfs.
- Since water supply not dependent on Souhegan River no PISF proposed.

Public Water Supply

Ground Water Supply Source

- Wilton Water Works
- Milford Water Works
- Pennichuck Water Works

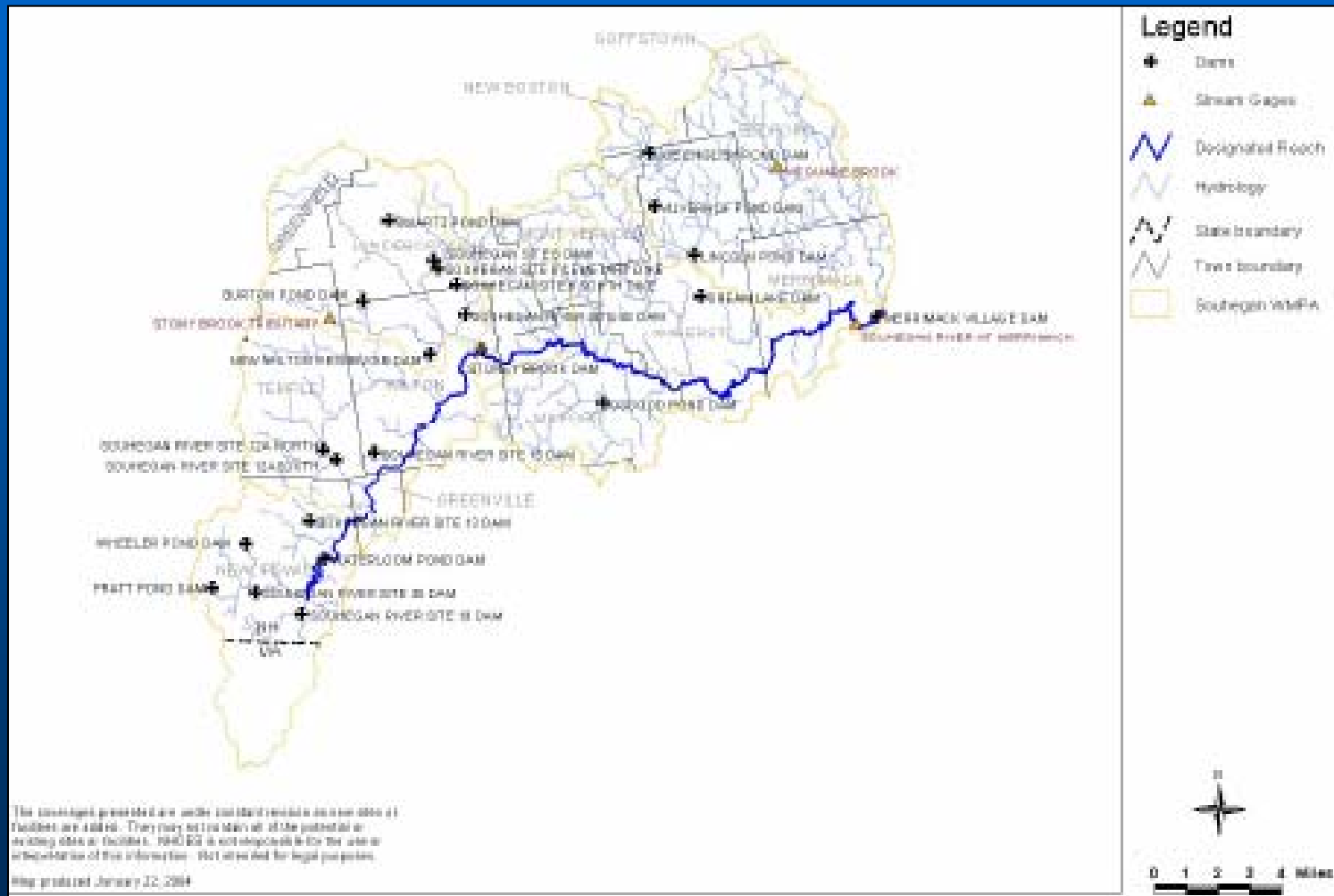
Badger Hill – Milford

Souhegan Woods – Amherst

Amherst Village District – Amherst

Groundwater supplies not dependent upon flow in Souhegan River so no Protected Instream Flow (PISF) proposed for these Public Water Supplies.

Hydroelectric Facilities



Hydroelectric Facilities

Active Hydroelectric facilities:

- Water Loom Falls Hydro in New Ipswich
- Otis Falls Hydro in Greenville
- Chamberlain Falls Hydro in Greenville
- Pine Valley Mill Dam in Wilton

Permitted Minimum Instream Flow:

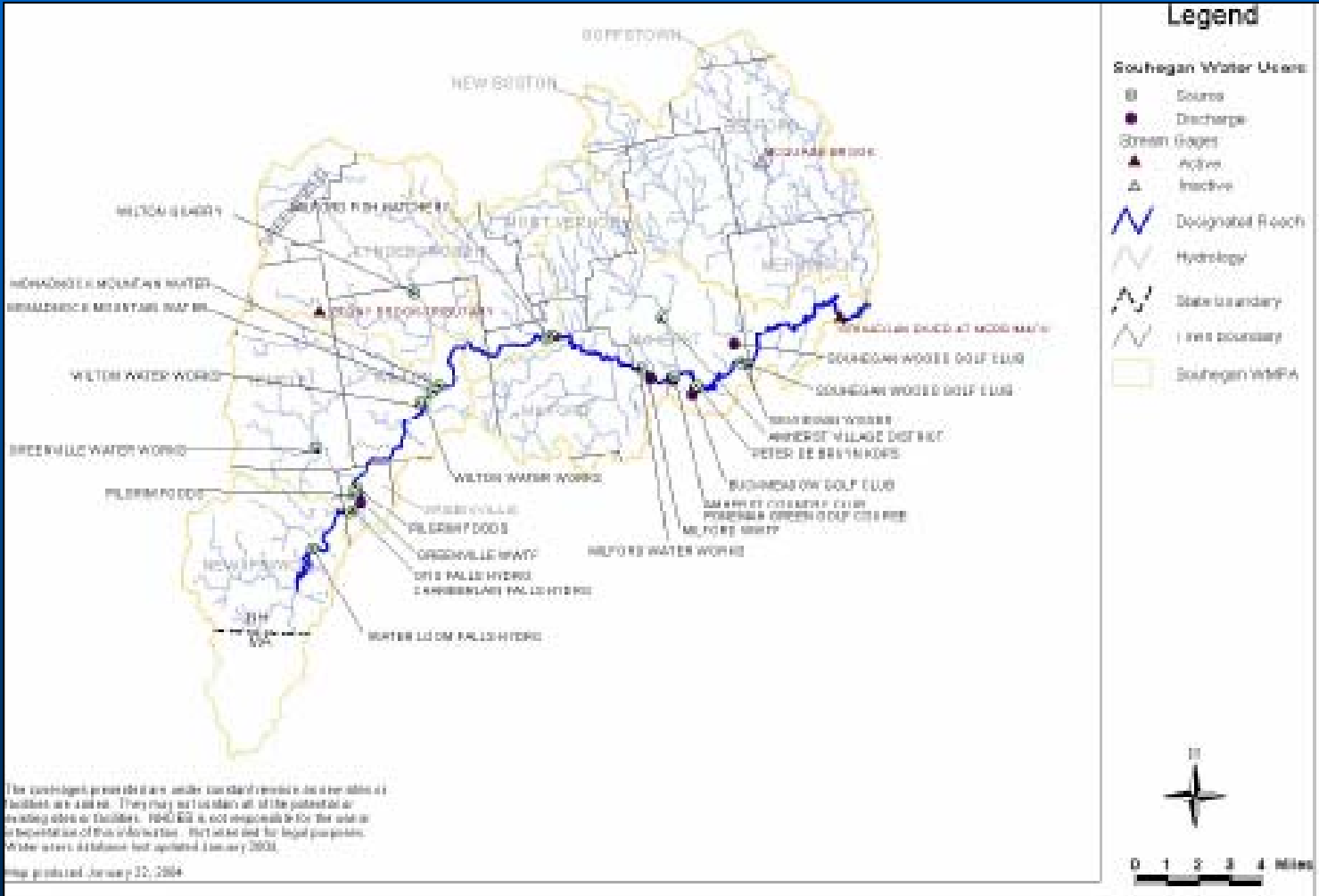
- | | |
|---------------------------|---|
| • Water Loom Falls Hydro | 15-17 cfs (0.66-0.75 cfs _m) |
| • Otis Falls Hydro | 20 cfs (0.67 cfs _m) |
| • Chamberlain Falls Hydro | 20 cfs (0.68 cfs _m) |
| • Pine Valley Mill Dam | 42.2 cfs (0.44 cfs _m) |

Hydroelectric Facilities PISF

- Operation of active hydroelectric facilities is dependent on flow in the Souhegan River.
- Minimum flow of operation established under facility license.
- Proposed PISF for each facility based on minimum flow requirement.

| PISFs for selected IPUOCRs | | | | | | | |
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| Water Quality | 2.4 cfs; <0.1 cfs/m | | | 9.4 cfs; <0.1 cfs/m | | | |

Wastewater Dischargers



Wastewater Dischargers

| Licensed Wastewater Discharges | Design Flow (MGD) |
|--------------------------------------|-------------------|
| • Greenville WWTP | 0.233 |
| • State of NH Milford Fish Hatchery | ~2.5 |
| • Milford Wastewater Treatment Plant | 2.15 |

Water Pollution Abatement PISF

- Operation of water pollution facilities is dependent on flow in the Souhegan River.
- Minimum flow of operation established under facility license.
- Proposed PISF for each facility based on 7Q10 flow.

| PISFs for selected IPUOCRs | | | | | | | |
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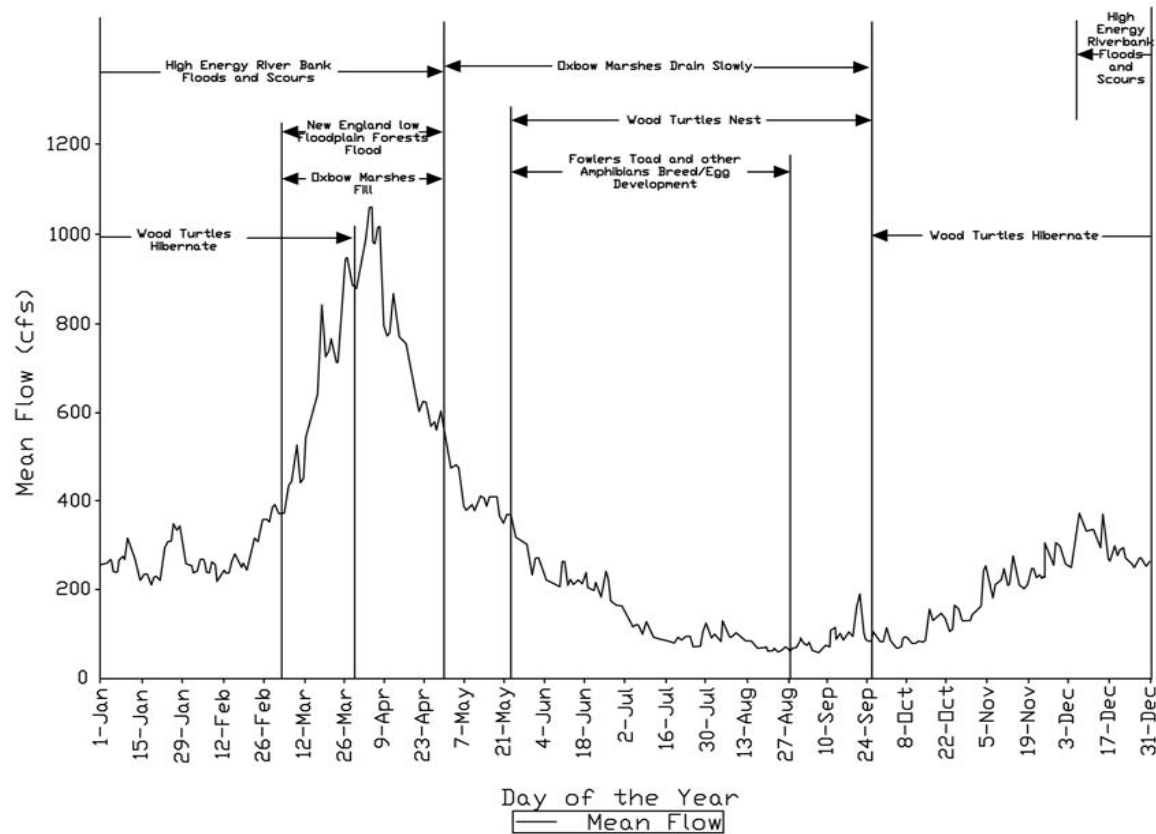
Water Quality Standards

- Based on previously released 305(d)/303(d) reports Souhegan River meets most water quality criteria, with some exceptions.
- All waters in state listed as non-supporting of aquatic life because of mercury.
- Portions of Souhegan River above confluence with Stony Brook listed as non-supporting of aquatic life due to pH, aluminum and macroinvertebrate and bioassessment criteria. Also, listed as non-supporting of primary contact recreation due to *E. Coli*.
- For upper river listings, for other than mercury, pollutant sources unknown and not flow related.

Water Quality Standards

- Lower section of Souhegan River is listed as threatened for aquatic life due to copper.
- The source of copper is listed as “municipal discharges”.
- Milford WWTF has specific NPDES limit for copper and is regulated based on 7Q10 flow.
- 7Q10 flow limits possibly exceeded during past three years only during one three day period (August 29 to 31, 2001) during drought conditions.
- For that period Milford WWTF would have had to discharge at maximum permit level to exceed instream water quality standard.

Natural Communities and RTE Wildlife and Plants



Plant Community and Wildlife Flow Sensitive Bio Periods

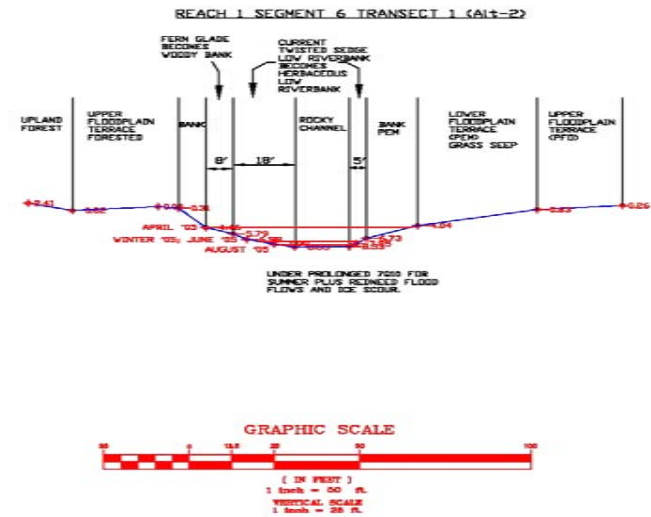
High Energy Riverbank

Twisted Sedge Low Riverbank & Fern Glade



- Twisted sedge community: Rare to locally abundant
 - In cobbles above summer water level
- Fern Glade: Status unknown
 - Above Twisted Sedge and below forest terrace
- Both communities:
 - high flow dependent
 - low flow tolerant

Twisted Sedge Low Riverbank & Fern Glade

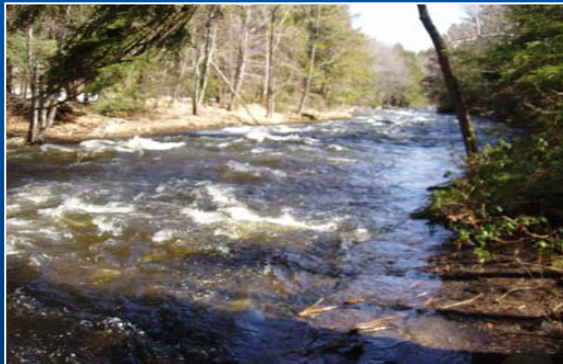


High Energy Riverbank

Twisted Sedge Low Riverbank & Fern Glade

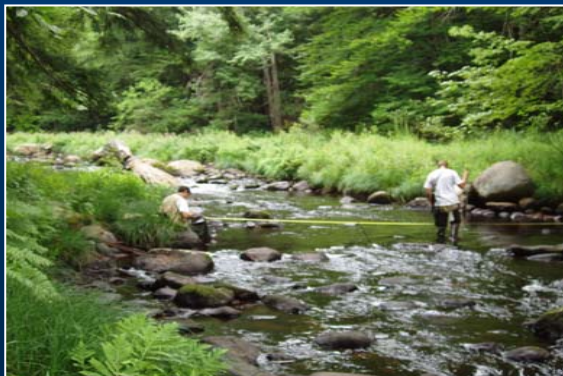


Winter Ice Scour



Spring Flooding and Scour

Spring High Flows > 500 cfs
(2.9 cfs/m) March, April or May



Low Summer Flows

Summer Low Flows ≤ 50 cfs
(0.30 cfs/m) by Aug. or Sept.

Southern New England Floodplain Forest

Sycamore (*Platanus occidentalis*) Floodplain Forest

- High-gradient, cobble-channel, flashy rivers
- High Flow (Flood) dependent for Sycamore regeneration
- Low Flow tolerant
- Possible evidence of flood regime change: upland and invasive understory plants.



Southern New England Floodplain Forest

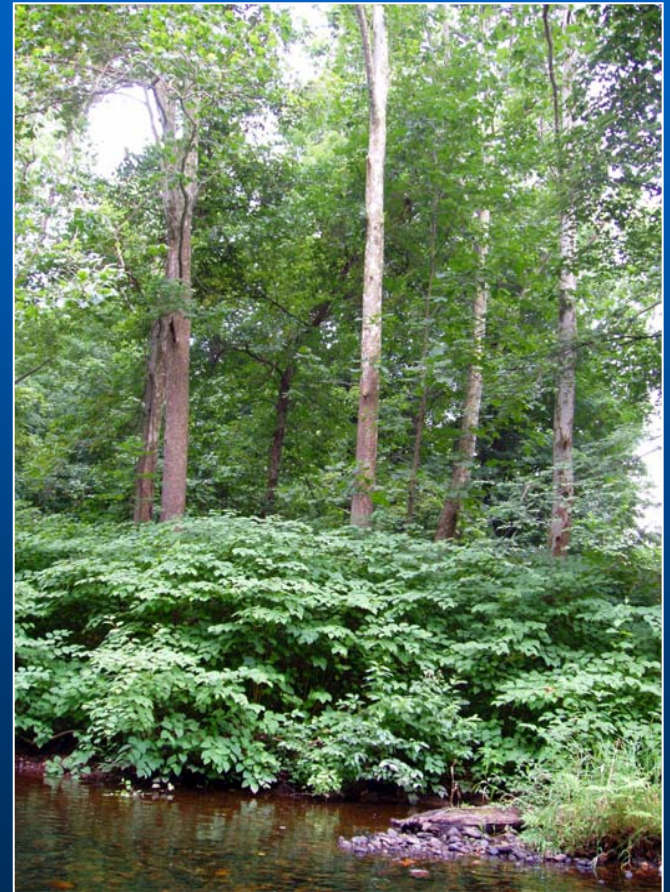
Sycamore (*Platanus occidentalis*) Floodplain Forest



Periodic Spring Flooding
(1-3 years)

Spring High Flows

> 3000 cfs(17.5 cfs/m) at
least once every 3 years



Southern New England Floodplain Forest

Silver Maple (*Acer saccharinum*) Floodplain Forest



- Medium to large, low gradient rivers
- Silver Maple-False Nettle-Sensitive Fern variant
- High Flow (Flood) dependent
- Low Flow Tolerant

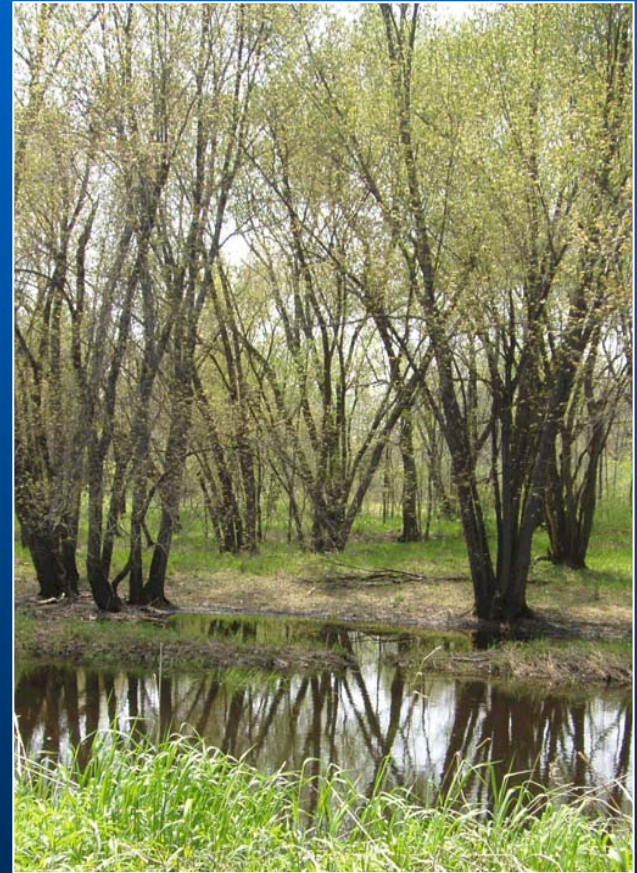
Southern New England Floodplain Forest

Silver Maple (*Acer saccharinum*) Floodplain Forest



Periodic Spring Flooding
(every 1-3 years or more)

High Spring Flows > 2000
cfs (11.7 cfs/m) at least
every 2 years



Oxbow/Backwater Marsh

- Low gradient, meandering rivers
- Fill in spring as lower floodplain floods and drain slowly through summer
- High Flow and low flow dependent
- Highly tolerant of variation during any season



Oxbow/Backwater Marsh



**Spring Flooding to fill most
Oxbows before June**

**Spring High Flows > 600 cfs (3.5
cfsm)**



**Slowly declining water
levels through Summer**

**Standing water (2 ft) for
aquatic plants in many
directly connected marshes**



**Summer Low Flows > 30 cfs
(0.18 cfsm)**

**most of June through
September**

RTE Wildlife

Wood Turtle



- Lower Souhegan resident
- Nests in sand/gravel in floodplain or uplands – poor nest success
- Overwinters and may hibernate under water in shallows, pools, banks, debris
- Avoid Summer flooding of mid and high floodplain
 - flows < 1,000 cfs (5.8 cfs/m) June – Oct.
- Mean winter flows above mean Oct.-Nov. flows in any given year (mean Oct. flow - 0.62 cfs/m)

RTE Wildlife

Fowler's Toad

- Historical records from Amherst
 - Similar breeding requirements as American Toads
 - Sufficient water in oxbows and backwaters for eggs/tadpoles
 - Summer flows > 30 cfs (0.18 cfs/m)
- May through mid-August



RTE Wildlife

Osprey



**Sufficient Flows
for prey (fish)**

**Spring through
fall**

Common Loon



**Sufficient Flows
for prey (fish)**

**Spring through
fall**

RTE Plant Species

Wild Garlic

- Higher Floodplain Terraces
- Periodic flooding

Spring Flows $> 5,000$ cfs (29.2 cfs/m) every 10 years (10-yr return flood)

Wild Senna

- Higher Floodplain Terraces
- Periodic flooding

Spring Flows $> 5,000$ cfs (29.2 cfs/m) every 10 years

